Family Medicine and Occupational Health

Montreal, Canada

12-14 December, Concorde Hotel, Singapore
FAO Project:

Addressing Antimicrobial Usage in Asia’s Livestock, Aquaculture and Crop Production Systems
Project Activities:

- Conduct a review of current aquaculture practices for major aquaculture species in selected countries in Asia;

- Conduct a comprehensive review of diseases affecting the identified major aquaculture species in selected countries in Asia;

- Develop a framework and methodology document on antimicrobial use in the aquaculture industry in Asia to include the value chain, datasets to obtain, specific industry profiles to describe and what assessments will result (e.g. farm level, sector and national level assessments)
Project Activities:

- Pilot the methodology for AMU documentation on selected farms in Indonesia, Myanmar, Thailand and Viet Nam to include analysis of the results of the pilot study;

- Provide recommendations on prudent and responsible use of antimicrobials that will contribute to existing good aquaculture practices (GAP) and good biosecurity practices;
Project Activities:

- Conduct and document aquaculture stakeholder consultations (government, industry and academe) to raise awareness on the purpose and objectives of antimicrobial usage (AMU) and antimicrobial resistance (AMR) surveillance in aquaculture in selected developing countries;

- Using the results of the above activities, identify specific capacity requirements to implement effective AMU and AMR surveillance/diagnosis in the aquaculture sector.
Thailand
Shrimp aquaculture

Collaborator: Department of Fisheries

Dr. Thitiporn Laoprasert

Dr. Juliwan Roongkamnertwongsa
Ms. Jutamass Auewongaree
Viet Nam
Pangas catfish aquaculture

Collaborator: Department of Animal Health

Dr. Nguyen Van Long

Dr. Vo Dinh Chuong

Ms. Bui Thi Viet Hang
Myanmar
Freshwater finfish aquaculture

Collaborator: University of Yangon
Dr. Kay Lwin Tun
Dr. Hlaing Hlaing Thin Kyi
Dr. Moe Moe (Mandalay University)
Indonesia  Grouper aquaculture

Collaborator: Batam Marine Aquaculture Center

Mr. Toha Tusihadi
Mrs. Sri Agustatik
Ms. Tanjung Dwi Okta Nungraheni
This presentation:

• Survey of AMU in Thailand, Viet Nam, Myanmar and Indonesia

• Results and findings
  • AMU
  • Other chemicals
To undertake the survey

Questionnaire for AMU Survey

A simple questionnaire was developed to collect primary information on AMU in selected species for each country. This questionnaire was translated to local languages (Burmese, Thai, Vietnamese and Bahasa Indonesia).
### Cấu trúc của chuồng nuôi

#### Thong tin ve co so

1. Ten co so: 
2. Dia chi: 
3. Toa do: 
4. Ten chu co so: 
5. Loai thu san: 
6. Loai hinh san xuat: 
7. Thoi gian cho met vu xuat: 

### Informasi Pembudidaya

<table>
<thead>
<tr>
<th>Nama / Pokdekan</th>
<th>Alamat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pemilik / Ketua</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jenis Ikan</th>
<th>Luas lahan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jenis usaha</th>
<th>Pendekatan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Hatchery
- Pasca panen
- Tradisional

<table>
<thead>
<tr>
<th>Sistem usaha</th>
<th>Pendekatan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Semi intensif
- Super intensif
- Lainnya
Use of Antimicrobials and Other Chemicals
## Survey of AMU in shrimp aquaculture in Thailand

<table>
<thead>
<tr>
<th>Province</th>
<th>Hatchery</th>
<th>Grow-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Songkhla</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Trang</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Krabi</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Chantaburi</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>34</td>
</tr>
</tbody>
</table>
Thailand
Most farmers were very cooperative and willing to provide all the information that were asked. They even showed samples of the products that they are using without any hesitation from them.
### Thailand

<table>
<thead>
<tr>
<th>Antimicrobial used</th>
<th>Using antimicrobials</th>
<th>Do not use antimicrobials</th>
<th>Stopped using antimicrobials (past 1-10 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatchery</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Oxytetracycline</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (%)</td>
<td>4 (100.0)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Antimicrobials (mainly Oxytetracycline) are commonly used in the hatchery operation of shrimps;

- Oxytetracycline is approved by the FDA for use in any aquaculture operations.
Thailand

• Antimicrobials are directly applied in culture water either for prophylaxis (for prevention of disease at zoea stage) or treatment;

• Dosages used ranged from 1,000 to 1,500 mg/Ton;

• Antimicrobials are sourced directly from sales representatives of different drug companies in Thailand
**Thailand**

<table>
<thead>
<tr>
<th>Antimicrobial used</th>
<th>No. of farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using antimicrobials</td>
</tr>
<tr>
<td>Grow out</td>
<td>7*</td>
</tr>
<tr>
<td>Oxytetracycline</td>
<td>4</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>1**</td>
</tr>
<tr>
<td>Total</td>
<td>7 (29.2)</td>
</tr>
</tbody>
</table>

*3 farms used non-labeled antimicrobials

**used together with other antimicrobials by one farmer

- Most of the farmers has stopped (in the past 1-10 years) using (37.5%) or not using (33.3%) antimicrobials in their culture operations (total percentage=70.8%);

- Few farmers (29.2 %) use antimicrobials for prophylaxis and/or treatment of diseases, especially when threats of AHPND (EMS) and other diseases are imminent;
Thailand

• Commonly used antimicrobials was Oxytetracycline (FDA approved);

• Enrofloxacin was also used by one farmer (this antimicrobial is approved by FDA but is strictly regulated (only with prescription) and for use in fish culture only and not in shrimps);

• Antimicrobials are applied through feed incorporation within the first month of culture. Dosages used were 3,000-5,000 mg/kg feeds for Oxytetracycline, 5 ml/kg feeds for Enrofloxacin;
Thailand

- Antimicrobials are sourced directly from sales representatives of different drug companies in Thailand;

- Withdrawal period: with the practice of most shrimp farmers in using antimicrobials within the first month of grow-out culture only, there is sufficient withdrawal period (around two months) before the shrimps are harvested;
Thailand (Other Chemicals)

- Since most shrimp farmers have stopped using antimicrobials especially for grow-out operations, the following alternative chemicals and compounds are being used for water treatment/disinfection, feed supplementation and for prevention of disease outbreaks:
  - Probiotics (e.g. BioTonic; Plus-10) including Effective microorganisms (EM) locally produced by the DOF and distributed for free to shrimp farmers;
  - Potassium peroxymonosulfide;
  - Water coloring agent (composition not known; used to make the pond water green);
  - Povidone iodine;
  - Chlorine
Thailand (Other Chemicals)

- Vitamin C and Vitamin mix;
- Protein supplement (Beta-Sim-5);
- Pond Plus (Novozymes);
- Astaxanthin;
- Decosohexaenoic acid (DHA; Bi-omega);
- Fermented coconut oil;
- Herbal extracts.

All of the above products are properly registered with the Food and Drug Administration under the Ministry of Public Health for distribution and use in shrimp and fish farms.
Viet Nam

Pangas catfish farms surveyed in An Giang, Dong Thap and Can Tho provinces (n=76 farms)

<table>
<thead>
<tr>
<th></th>
<th>Hatchery (24 h)</th>
<th>Nursery (68 days)</th>
<th>Grow-out (246 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of farms</td>
<td>2</td>
<td>13</td>
<td>61</td>
</tr>
<tr>
<td>Farms with VietGap certificate</td>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Farms with ASC certificate</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Farms with ASC + BAP certificate</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Farms with ASC+BAP+GlobalGAP certificate</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Farms with QUACERT certificate</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farms producing for export</td>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>Farms producing for domestic market</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Farms producing for both markets</td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

Most of farms with international certifications (ASC, BAP, GlobalGAP) are production areas of export companies such as Vinh Hoan, Agifish and Hiep Thanh.
Viet Nam

AMU Survey on Pangas Catfish in Viet Nam
Viet Nam

Hatchery

Hatcheries do not use any antimicrobials:

• broodstock are highly resistant to diseases;
• fish larvae are maintained at the hatcheries at a very short period (less than 24 hours post hatching) prior to selling to nursery farms
Viet Nam

Nursery and Grow-out

- Antimicrobials are used widely at the surveyed farms (66/76 farms; 86.84%) under different commercial names (brand names) and active ingredients;

- As the nursery is a very sensitive stage in terms of susceptibility to many diseases, and often suffers huge losses, farmers have to use various kinds of antimicrobials to deal with disease problems.
Viet Nam

<table>
<thead>
<tr>
<th>Antimicrobials (n=14)</th>
<th>No. of farms</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>37</td>
<td>56.06</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>31</td>
<td>46.97</td>
</tr>
<tr>
<td>Florfenicol</td>
<td>29</td>
<td>43.94</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>16</td>
<td>24.24</td>
</tr>
<tr>
<td>Colistine</td>
<td>16</td>
<td>24.24</td>
</tr>
<tr>
<td>Levomycine</td>
<td>12</td>
<td>18.18</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>11</td>
<td>16.67</td>
</tr>
<tr>
<td>Sulfamethoxazol</td>
<td>9</td>
<td>13.64</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>7</td>
<td>10.61</td>
</tr>
<tr>
<td>Oxytetracycline</td>
<td>6</td>
<td>09.09</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>5</td>
<td>07.58</td>
</tr>
<tr>
<td>Kanamycine</td>
<td>2</td>
<td>03.03</td>
</tr>
<tr>
<td>Gentamycine</td>
<td>2</td>
<td>03.03</td>
</tr>
<tr>
<td>Rifamycine</td>
<td>1</td>
<td>01.52</td>
</tr>
</tbody>
</table>

All of these antimicrobials are allowed for use in aquaculture by the Department of Animal Health.
Viet Nam

Nursery and Grow-out

• Antimicrobials are applied by feed incorporation;

• Dosage: most farmers often use antimicrobials upon instructions of the drug dealers, thus are not aware of the actual dosages that they have used or using;

• Treatment duration ranged from 1 to 7 days, with 3 days treatment as the most common;
Viet Nam

Nursery and Grow-out

• Withdrawal period for the used antimicrobials prior to harvesting at the commercial farms is 120 days on the average;

• Commercial farms producing pangas catfish for export stop using antimicrobials earlier (when cultured stock reached 500-600 g) compared to farms producing fish for domestic consumption;
Vietnam

Nursery and Grow-out

- Nursery farms used antimicrobials much more frequently and continuously than grow-out farms, until the seedlings were sold to middlemen or grow-out farms;

- Very limited number of farms use prescription from certified veterinarian before they purchase any antimicrobials;
Viet Nam

Nursery and Grow-out

• Most farmers can buy antimicrobials from local veterinary drug stores even without prescription.
Vietnam (Other Chemicals)

- Due to the wide use of antimicrobials in most culture operations, few nursery and grow-out farmers use other chemicals and compounds including:

  - Probiotics
  - vitamins (C and B12)
  - herbal extracts (e.g. Yucca extract)
Myanmar

There is no record of antimicrobial use in Myanmar due to:

• most fish farmers are practicing extensive culture system; and,

• many are not aware on AMU and AMR.

An awareness seminar on AMU and AMR was undertaken instead.
Myanmar

AMU/AMR Awareness in Myanmar

The seminar was attended by:

- 30 freshwater fish farmers (from Yangon and nearby aquaculture areas);
- 2 DOF officers;
- Staff of Yangon University;
- Officers of Myanmar Fisheries Federation
AMU/AMR Awareness in Myanmar

Topics presented to the fish farmers in local language:

• **Antimicrobial Use and Antimicrobial Resistance in Aquaculture** (Dr. E. Leaño, with simultaneous translation to Burmese by Dr. K.L.Tun)

• **Freshwater Fish Disease and How to Inform the National and Competent Laboratories** (Dr. Tun)

• **Biosecurity in Aquaculture** (Dr. Leaño)
AMU/AMR Awareness in Myanmar

Topics presented to the fish farmers in local language:

- **Special lecture on Tilapia Lake Virus** (Dr. Leaño, as per request of the farmers)

- **Water Quality Parameters in Aquaculture** – with a hands-on demonstration on how to measure basic water quality parameters (Dr. Tun)
AMU/AMR Awareness in Myanmar

- Participants were then requested to fill-up the questionnaire that was developed for AMU survey (translated in Burmese).
Myanmar

• Although it is already given that no antibiotics are used in Myanmar for fish culture, they were instructed to include the other chemicals that they are using in the farms.

• Other chemicals used for pond preparation and water treatment/disinfection include:
  • lime (CaO);
  • dolomite (CaMg(CO$_3$)$_2$);
  • CaCO$_3$;
  • CaOH;
  • For treatment of parasitic infestation, most farmer just use salt (NaCl)
Indonesia

Grouper farms surveyed for AMU in Indonesia

<table>
<thead>
<tr>
<th>Province</th>
<th>Hatchery</th>
<th>Nursery</th>
<th>Grow-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riau Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batam</td>
<td></td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Bintan</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Ananbas</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Natuna</td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7</td>
<td>1</td>
<td>40</td>
</tr>
</tbody>
</table>

Results of the survey are still being analyzed and summarized.
Indonesia

AMU survey in Indonesia

Riau and East Java
Indonesia

AMU survey in Indonesia

Riau and Lampung
SUMMARY

- Antimicrobials are commonly used in the shrimp hatchery operations in Thailand, while only few grow-out farmers use antimicrobials within the first month of culture;

- For pangas catfish, antimicrobials are widely used in both nursery and grow-out operations;

- Commonly used antimicrobials are oxytetracycline (for shrimps) and amoxicillin, doxycycline and florfenicol (for pangas catfish);
SUMMARY

- Most farmers use antimicrobials that are approved by the proper authority of the country for use in aquaculture operations;

- Sufficient withdrawal periods (2 months for shrimps and 4 months for pangas catfish) are practiced by farmers, to make sure that the harvested products are free from any antimicrobial residues; especially those that are intended for export;

- The non-usage of antimicrobials can be correlated to the increased number of alternative chemicals, biological agents and feed supplements that are being used by the farmers to improve health of cultured stocks and to prevent diseases.
Thank you!